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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/754,176

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Xinhe Tang

P/4238-11

8489

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02/27/2006

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EXAMINER

QUARTERMAN, KEVIN J

ART UNIT

PAPER NUMBER

2879

DATE MAILED: 02/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/754,176

Applicant(s)

TANG ET AL.

Examiner

Kevin Quarterman

Art Unit

2879

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 10 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-65 is/are pending in the application.
- 4a) Of the above claim(s) 36-59 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-35 and 60-65 is/are rejected.
- 7) ☒ Claim(s) 1 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 January 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>0104; 0505</u>  | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election of Group I, claims 1-35 and 60-65 in the reply received on 10 January 2006 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).
2. Claims 36-59 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply received on 10 January 2006.

### ***Drawings***

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "adhesion layer" of independent claim 1 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.
4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: Reference characters "24" and "28" of Figure 1 and reference character "30" of Figure 2 are not mentioned in the description.
5. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add

the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

6. Claim 1 is objected to because of the following informalities: Claim 1 recites the limitation "the plurality of cathodes" in the fourth line from the last line of the claim. There is insufficient antecedent basis for this limitation in the claim. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1-6, 9-12, 14-17, 20-35, and 60-65 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee (US 2004/0104668).

9. Regarding independent claim 1, Figure 4A of Lee shows a field emission device comprising a plurality of conductive anodes (76), each anode having a light-emitting layer (78); a plurality of electron emitters (86), the emitters being separated from the plurality of anodes by a spacer (¶ [0030]) forming a gap, each of the plurality of emitters comprising a conductive electrode (80); and a plurality of fibrous clusters (86), each of the plurality of fibrous clusters comprising a plurality of nanofibers adhered to the conductive electrode by an adhesive (84, 85), wherein at least a portion of the plurality of fibrous clusters have a hemispheroidal shape (¶ [0033]), and wherein the plurality of conductive anodes and the plurality of cathodes are operatively connected to an electronic circuit such that the electronic circuit is capable of controlling the emission of electrons between the plurality of electron emitters and the plurality of anodes. The Examiner notes that the patentability of a product does not depend on its method of production (MPEP § 2113). Thus, the fibrous clusters being formed by a chemical

vapor deposition process; the nanofibers being grown from a catalytic particulate cluster; and the adhesion layer being formed during processing of a catalyst precursor have not been given patentable weight.

10. Regarding claim 2, Figure 4A of Lee shows the light-emitting layer comprising a mixture of phosphors (78B, 78R, 78G).

11. Regarding claim 3, Lee discloses a reflective film adhered to the light-emitting layer between the anode and the cathode (§ [0031]).

12. Regarding claim 4, Lee discloses the reflective film being made of aluminum (§ [0031]).

13. Regarding claim 5, Lee discloses the nanofibers being carbon nanofibers (§ [0033]).

14. Regarding claim 6, the Examiner notes that the patentability of a product does not depend on its method of production (MPEP § 2113).

15. Regarding claim 9, Lee discloses the hemispheroidal shape being one of an oblate hemispheroid and a prolate hemispheroid (§ [0033]).

16. Regarding claim 10, Lee discloses the hemispheroidal shape being one of an oblate hemispheroid (§ [0033]).

17. Regarding claim 11, Lee discloses at least a portion of the carbon nanofibers being comprised of carbon nanotubes (§ [0033]).

18. Regarding claim 12, Lee discloses the carbon nanotubes being multi-walled carbon nanotubes (§ [0033]).

19. Regarding claim 14, Lee discloses the plurality of carbon nanofibers being entangled (§ [0033]).
20. Regarding claim 15, Lee discloses the plurality of fibrous clusters being isolated from neighboring fibrous clusters (§ [0033]).
21. Regarding claim 16, Figure 4A of Lee shows the adhesion layer being formed of one of an intermetallic, a carbide, a nitride and combinations thereof.
22. Regarding claim 17, Lee discloses the conductive electrode being comprised of aluminum or aluminum alloy (§ [0031]).
23. Regarding claims 20-24, the Examiner notes that the patentability of a product does not depend on its method of production (MPEP § 2113).
24. Regarding claim 25, Figure 4A of Lee shows a pattern of evenly dispersed fibrous clusters (86).
25. Regarding claim 26, Figure 4A of Lee shows the fibrous clusters (86) uniformly sized.
26. Regarding claim 27, Figure 4A of Lee shows the light-emitting layer comprising a mixture of phosphors such that the light-emitting layer emits light of a predetermined color.
27. Regarding claims 28-29, the Examiner notes that claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function (MPEP § 2114). Thus, the functional limitations of the electronic circuit have not been given patentable weight.

28. Regarding claim 30, Lee discloses the electronic circuit including a triode structure (¶ [0012]).
29. Regarding claims 31-35, the Examiner notes that when the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (MPEP § 2112.01).
30. Regarding independent claim 60, Figure 4A of Lee shows a field emission device comprising a plurality of anodes (76) aligned in rows, each anode having a light-emitting layer (78) and each anode being separated from an opposing cathode (80) by a spacer (¶ [0030]), each cathode having an electron-emitting layer (86) comprised of nanofibers (¶ [0033]), the plurality of anodes and the plurality of cathodes being operatively connected to an electronic circuit.
31. Regarding claim 61, Lee discloses the electronic circuit including a triode structure (¶ [0012]).
32. Regarding claims 62-64, the Examiner notes that when the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (MPEP § 2112.01).
33. Regarding claim 65, Lee discloses that field emission device may be used in liquid crystal displays (¶ [0004]).

***Claim Rejections - 35 USC § 103***

34. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and



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the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

35. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

36. Claims 7-8, 13, 18-19, and are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (US 2004/0104668).

37. Regarding claims 7-8 and 13, Lee teaches the limitations of claim 5 discussed earlier but fails to exemplify the range of the outer cylindrical diameters of the carbon nanofibers being no greater than 200 nanometers and being at least 50 nanometers. Lee discloses that design choices consisting of area, number, and interval of the emitting layer are not limited (§ [0033]).

38. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the field emission device of Lee with nanofibers being no greater than 200 nanometers and being at least 50 nanometers, since where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation (MPEP § 2144.04).

39. Regarding claims 18-19, Lee teaches the limitations of claim 5 discussed earlier but fails to exemplify a mean major axis of the fibrous clusters being no greater than 1000 times a mean outer cylindrical diameter of the fibrous clusters. Lee discloses that design choices consisting of area, number, and interval of the emitting layer are not limited (¶ [0033]).

40. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the fibrous clusters of Lee with a mean major axis being no greater than 1000 times a mean outer cylindrical diameter, since where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation (MPEP § 2144.04).

### ***Conclusion***

41. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Akiyama (US 6,914,372) discloses an electron emission device. Filas (US 6,741,019) discloses an article with aligned nanowires. Choi (US 6,504,292) discloses a field emitting device with metallized nanostructures.

**Contact Information**


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quarterman whose telephone number is (571) 272-2461. The examiner can normally be reached on M-TH (7-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kevin Quarterman  
Examiner  
Art Unit 2879

kq   
21 February 2006

  
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